

REMARKS

Applicants will address each of the Examiner's rejections in the order in which they appear in the Final Rejection.

Claim Rejections – 35 USC §112

In the Final Rejection, the Examiner rejected Claims 1-12 under 35 USC §112, first paragraph, as failing to comply with the written description requirement. This rejection is respectfully traversed.

In particular, the Examiner appeared to be objecting to the deletion of the term “organic” in Amendment A. In order to advance the prosecution of this application, in Amendment C, Applicants amended the claims to recite “organic.” In the Advisory Action, the Examiner stated that this overcame the §112 rejection. As a RCE is being filed herewith, Amendment C should now be entered. Accordingly, it is respectfully requested that this rejection be withdrawn.

Claim Rejections – 35 USC §103

The Examiner also rejects Claims 1-4 under 35 USC §103(a) as being unpatentable over O'Brien et al. or Baldo et al. in view of Salbeck et al. and Claims 5-12 under 35 USC §103(a) as being unpatentable over Grushin et al. in view of Salbeck et al. These rejections are respectfully traversed.

Applicants have reviewed the Examiner's comments but still respectfully submit that the combination of references to arrive at the claimed invention is improper.¹ More specifically, one feature of the claimed invention is that a spiro compound is used as a host material of a

¹ Applicants have reviewed their prior responses and believe that a couple typographical errors were made in the Remarks. As these may have been contributed to the Examiner's maintenance of these rejections, Applicants are submitting a marked-up copy of each at Exhibits A and B to show the correct statements.

luminescent layer, a hole transport layer, or a hole blocking layer in an organic EL element capable of converting triplet excitation energy into light to be emitted, and therefore, **both** the spiro compound and an organic luminescent layer capable of converting triplet excitation energy into light to be emitted are used for an organic EL element. Accordingly, one feature of the device of the claimed invention is the combination of the spiro compound and an organic luminescent layer capable of converting triplet excitation energy into light to be emitted. As Applicants discovered, such a combination has an advantageous effect.

For example, very large excitation energy is necessary in order that a triplet luminescent material emits light. Further, in order to emit phosphorescence from a triplet luminescent material, it is necessary to obtain a larger excitation energy than the excitation energy for a material that emits phosphorescence from a singlet luminescent material. However, while triplet excitation energy is larger than singlet excitation energy, a triplet luminescent material has a small molecular weight and low molecular stability, and tends to cause morphological change compared to an EL element capable of converting singlet excitation energy into light to be emitted.

Applicants, however, have discovered that high durability associated with increase of glass transition temperature and high molecular stability are possible by using a spiro compound. Therefore, by applying the spiro compound to an EL element, both larger excitation energy for emitting phosphorescence and high molecular stability can be obtained since molecular weight of the compound is increased with the larger excitation energy maintained. Hence, from the aspect of enlarging triplet excitation energy and improving film quality, a spiro compound is more effective in the EL element converting triplet excitation energy into light to be emitted rather than an EL element converting singlet excitation energy into light to be emitted.

In order to advance the prosecution of this application, Applicants have amended the claims to make it clear that the spiro compound is included in the organic EL film and to make clear the combination of the spiro compound and an organic luminescent layer capable of converting triplet excitation energy into light to be emitted. As none of the cited references disclose or suggest the combination of the spiro compound and an organic luminescent layer capable of converting triplet excitation energy into light to be emitted, nor the effect thereof, it is respectfully submitted that the combination of references to arrive at the claimed invention and the rejection based thereon is improper. Therefore, it is respectfully requested that these rejections now be withdrawn.

Conclusion


It is respectfully submitted that the present application is in a condition for allowance and should be allowed.

If any fee is due for this amendment, please charge our deposit account 50/1039.

Favorable reconsideration is earnestly solicited.

Respectfully submitted,

Date: January 10, 2005


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In response to the Office Action dated December 23, 2003, please amend the above-identified application as follows:

IN THE CLAIMS:

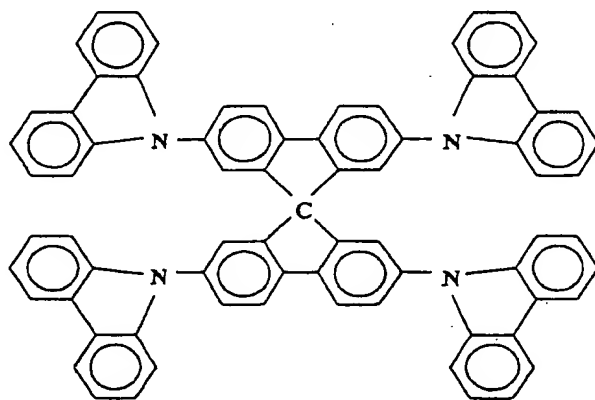
Please amend claims 1, 3, 5, 7, 9 and 11 as follows:

1. (Currently amended) A light emitting device comprising an electroluminescence element, said electroluminescence element comprising:

a luminescent layer comprising an organic compound, said luminescent layer capable of converting triplet excitation energy into light to be emitted; and

a host material for said luminescent layer,

wherein said host material comprises a material expressed by the following formula



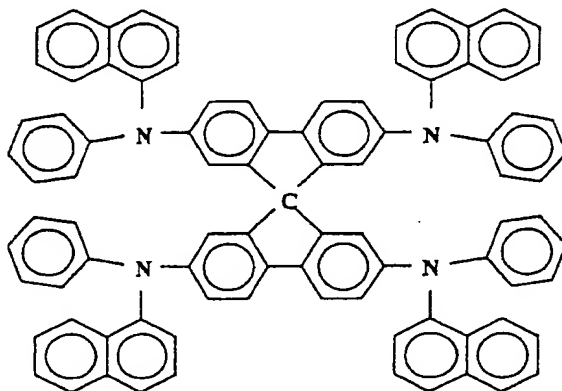
2. (Original) An electronic appliance comprising said light emitting device according to claim 1, wherein said electronic appliance is selected from the group consisting of an organic electroluminescence display, a video camera, a digital camera, a portable computer, a personal computer, a mobile telephone, and an acoustic equipment.

3. (Currently amended) A light emitting device comprising an electroluminescence element, said electroluminescence element comprising:

at least a hole transport layer; and

a luminescent layer comprising an organic compound adjacent to said hole transport layer, said luminescent layer being capable of converting triplet excitation energy into light to be emitted; and

wherein said hole transport layer comprises a material expressed by the following formula



4. (Original) An electronic appliance comprising said light emitting device according to claim 3, wherein said electronic appliance is selected from the group consisting of an organic electroluminescence display, a video camera, a digital camera, a portable computer, a personal computer, a mobile telephone, and an acoustic equipment.

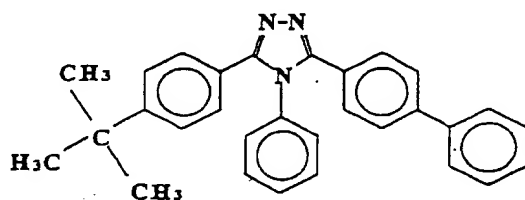
5. (Currently amended) A light emitting device comprising an electroluminescence element, said electroluminescence element comprising:

at least a luminescent layer comprising an organic compound, said luminescent layer capable of converting triplet excitation energy into light to be emitted;

a host material for said luminescent layer; and

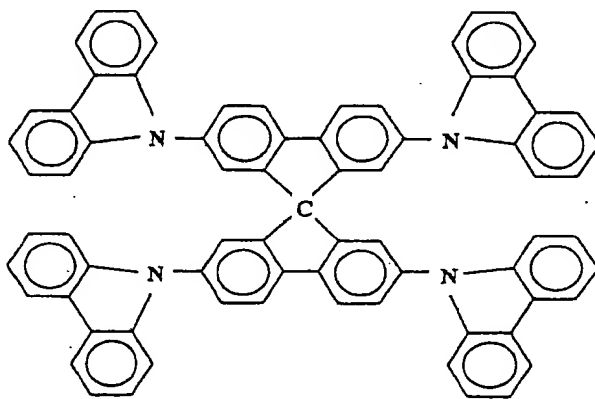
a hole blocking layer provided adjacent to said luminescent layer,

wherein said hole blocking layer comprises a material expressed by the following formula



, and

wherein said host material comprises a material expressed by the following formula



6. (Original) An electronic appliance comprising said light emitting device according to claim 5, wherein said electronic appliance is selected from the group consisting of an organic electroluminescence display, a video camera, a digital camera, a portable computer, a personal computer, a mobile telephone, and an acoustic equipment.

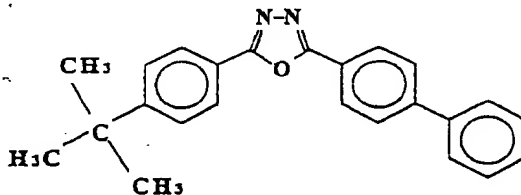
7. (Currently amended) A light emitting device comprising an electroluminescence element, said electroluminescence element comprising:

at least a luminescent layer comprising an organic compound, said luminescent layer capable of converting triplet excitation energy into light to be emitted;

a host material for said luminescent layer; and

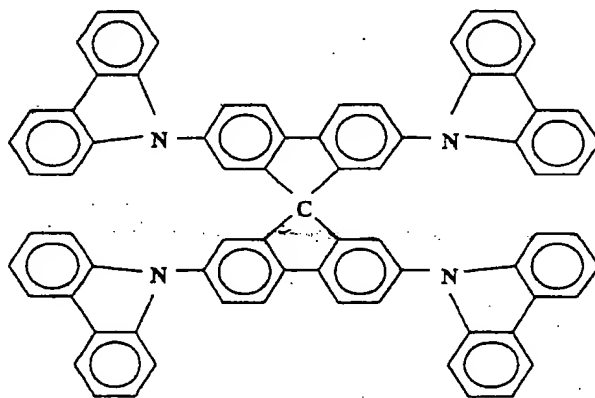
a hole blocking layer provided adjacent to said luminescent layer,

wherein said hole blocking layer comprises a material expressed by the following formula



, and

wherein said host material comprises a material expressed by the following formula



8. (Original) An electronic appliance comprising said light emitting device according to claim 7, wherein said electronic appliance is selected from the group consisting of an organic electroluminescence display, a video camera, a digital camera, a portable computer, a personal computer, a mobile telephone, and an acoustic equipment.

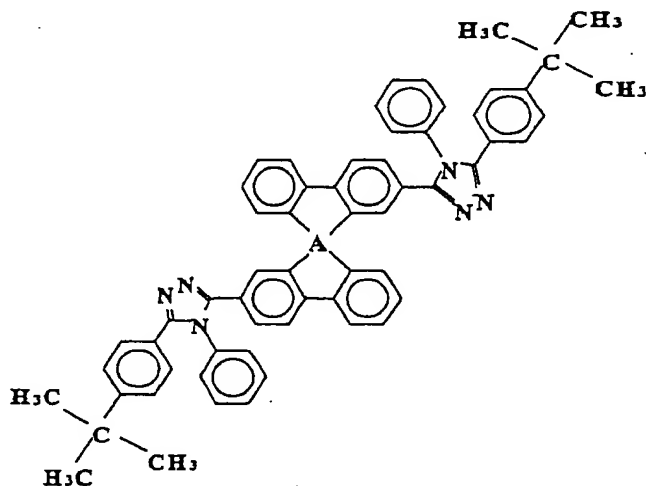
9. (Currently amended) A light emitting device comprising an electroluminescence element, said electroluminescence element comprising:

at least a luminescent layer comprising an organic compound, said luminescent layer capable of converting triplet excitation energy into light to be emitted; and

a hole blocking layer provided adjacent to said luminescent layer,

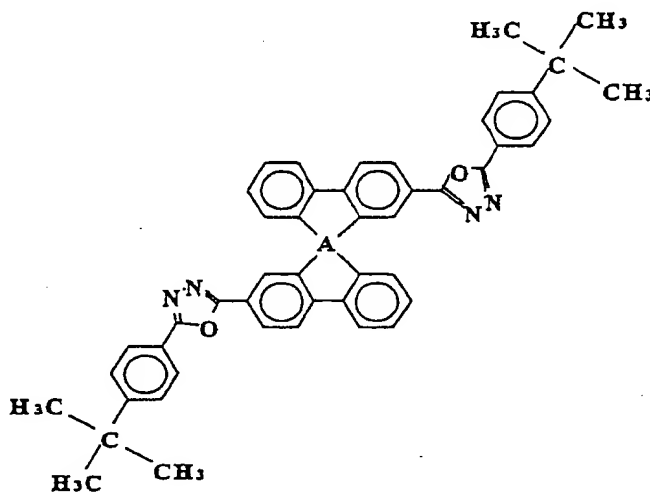
wherein said hole blocking layer comprises a material expressed by the following formula, and

wherein "A" indicates one of carbon or silicon



10. (Original) An electronic appliance comprising said light emitting device according to claim 9, wherein said electronic appliance is selected from the group consisting of an organic electroluminescence display, a video camera, a digital camera, a portable computer, a personal computer, a mobile telephone, and an acoustic equipment.

wherein "A" indicates one of carbon or silicon



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REMARKS

We are in receipt of the Office Action dated December 23, 2003, and the above amendment and following remarks are made in light thereof.

Claims 1-12 are pending in the application. Pursuant to the Office Action, claims 1-12 are rejected under 35 USC 112, first paragraph for failing to comply with the written description requirement. The examiner contends that the deletion of the term "organic" from various claims pursuant to Amendment A results in the claims containing subject matter not described in the specification. Pursuant to the present amendment, claims 1, 3, 5, 7, 9 and 11 have been amended to include the reference to an "organic compound."

Claims 1-4 are rejected under 35 USC 103(a) as being unpatentable over O'Brien et al. over Baldo et al., either reference in view of Salbeck et al. Claims 5-12 are rejected under 35 USC 103(a) as being unpatentable over Grushin et al. U.S. 2002/0121638 A1 in view of Salbeck et al.

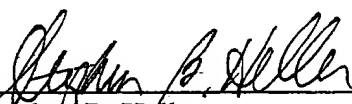
An object of the present invention is to suppress the time deterioration of luminance and to increase the element life in an EL element that is capable of converting triplet excitation energy into light to be emitted. A further object of the invention is to provide an organic EL element having high luminous efficiency and higher durability than a conventional element. One of the features of the present invention is that a spiro compound is used for the EL element for converting triplet excitation energy into light to be emitted. Very large excitation energy is necessary ^{in order} ~~so that the phosphorescence~~ ^{a triplet luminescent} material emits light. A material that requires a large excitation energy tends to undergo morphological change, such as aggregation or crystallization, since the molecular weight thereof is usually small. Therefore, the EL element that converts triplet excitation energy into light to be emitted must use a material that can undergo

morphological change, as compared to an EL element capable of converting singlet excitation energy into light to be emitted. The high durability associated with the increase of glass transition temperature and high molecular stability become possible by using the spiro compound. Thus, from the aspect of increasing the triplet excitation energy and improving film quality, a spiro compound is used more effectively in the EL element converting triplet excitation energy into light to be emitted, rather than in an EL element converting singlet excitation energy into light to be emitted.

With the foregoing in mind, applicant respectfully submits that the examiner's reliance on Salbeck et al. is not warranted. First, Salbeck et al. do not disclose an organic compound for converting triplet excitation energy into light to be emitted (~~phosphorescence material~~). Second, Salbeck et al. do not disclose either the intention or the advantage of using a spiro compound for the organic compound. Therefore, applicant submits that there is no motivation to combine Salbeck et al. with either O'Brien et al. or Baldo et al.

In view of the foregoing, applicant respectfully submits that the application is in condition for allowance, and an early Office Action in this regard is earnestly solicited.

Respectfully submitted,



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Corrected
markup copy

Attorney Docket SEL 274

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of)
Nishi et al.)
Serial No.: 09/941,048)
Filed: August 28, 2001)
For: Light Emitting Device)
Art Unit: 1774)
Examiner: M. Yamnitzky)

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to:
the Commissioner for Patents,
P.O. Box 1450, Alexandria, VA 22313-1450 on

November 10, 2004

(Date of Deposit)

Shannon Wallace

Name of applicant, assignee, or Registered Rep.

Shannon Wallace 11/10/04
Signature Date

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT C (AFTER FINAL)

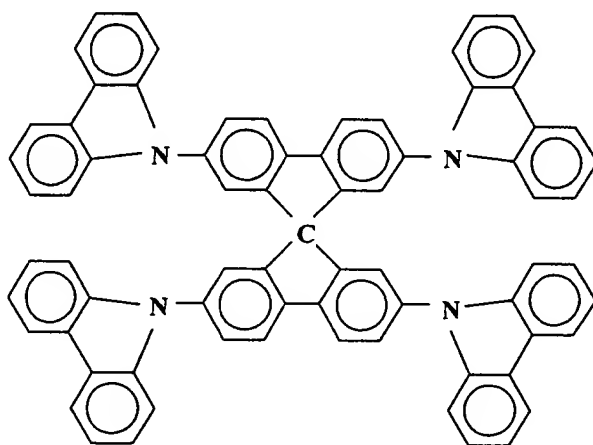
Sir:

In response to the Final Rejection dated August 10, 2004, please enter the following amendment in the above-identified application:

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Currently amended) A light emitting device comprising an organic electroluminescence element, said electroluminescence element comprising:
- ~~an organic~~ luminescent layer ~~comprising an organic compound~~, said ~~luminescent layer~~ capable of converting triplet excitation energy into light to be emitted; and
- a host material for said luminescent layer,
- wherein said host material comprises a material expressed by the following formula



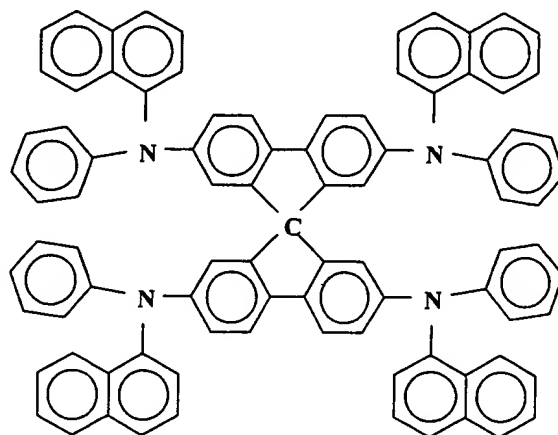
2. (Original) An electronic appliance comprising said light emitting device according to claim 1, wherein said electronic appliance is selected from the group consisting of an organic electroluminescence display, a video camera, a digital camera, a portable computer, a personal computer, a mobile telephone, and an acoustic equipment.

3. (Currently amended) A light emitting device comprising an organic electroluminescence element, said electroluminescence element comprising:

at least a hole transport layer; and

an organic luminescent layer ~~comprising an organic compound~~ adjacent to said hole transport layer, said luminescent layer being capable of converting triplet excitation energy into light to be emitted; and

wherein said hole transport layer comprises a material expressed by the following formula



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4. (Original) An electronic appliance comprising said light emitting device according to claim 3, wherein said electronic appliance is selected from the group consisting of an organic electroluminescence display, a video camera, a digital camera, a portable computer, a personal computer, a mobile telephone, and an acoustic equipment.

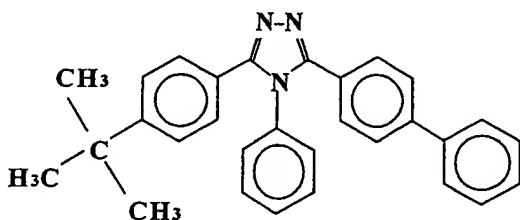
5. (Currently amended) A light emitting device comprising an organic electroluminescence element, said electroluminescence element comprising:

at least an organic luminescent layer ~~comprising an organic compound, said luminescent layer~~ capable of converting triplet excitation energy into light to be emitted;

a host material for said luminescent layer; and

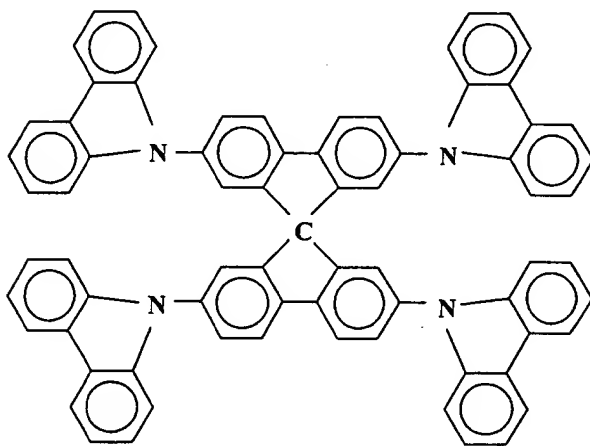
a hole blocking layer provided adjacent to said luminescent layer,

wherein said hole blocking layer comprises a material expressed by the following formula



, and

wherein said host material comprises a material expressed by the following formula



6. (Original) An electronic appliance comprising said light emitting device according to claim 5, wherein said electronic appliance is selected from the group consisting of an organic electroluminescence display, a video camera, a digital camera, a portable computer, a personal computer, a mobile telephone, and an acoustic equipment.

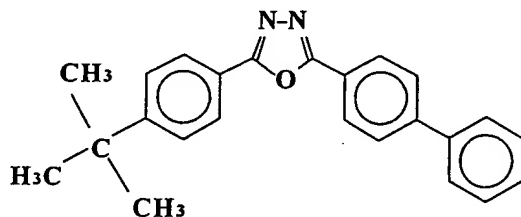
7. (Currently amended) A light emitting device comprising an organic electroluminescence element, said electroluminescence element comprising:

at least an organic luminescent layer ~~comprising an organic compound~~, said luminescent layer capable of converting triplet excitation energy into light to be emitted;

a host material for said luminescent layer; and

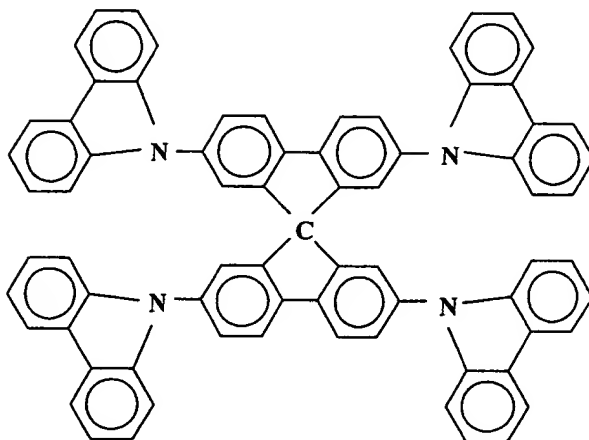
a hole blocking layer provided adjacent to said luminescent layer,

wherein said hole blocking layer comprises a material expressed by the following formula



, and

wherein said host material comprises a material expressed by the following formula



8. (Original) An electronic appliance comprising said light emitting device according to claim 7, wherein said electronic appliance is selected from the group consisting of an organic electroluminescence display, a video camera, a digital camera, a portable computer, a personal computer, a mobile telephone, and an acoustic equipment.

9. (Currently amended) A light emitting device comprising an organic electroluminescence element, said electroluminescence element comprising:

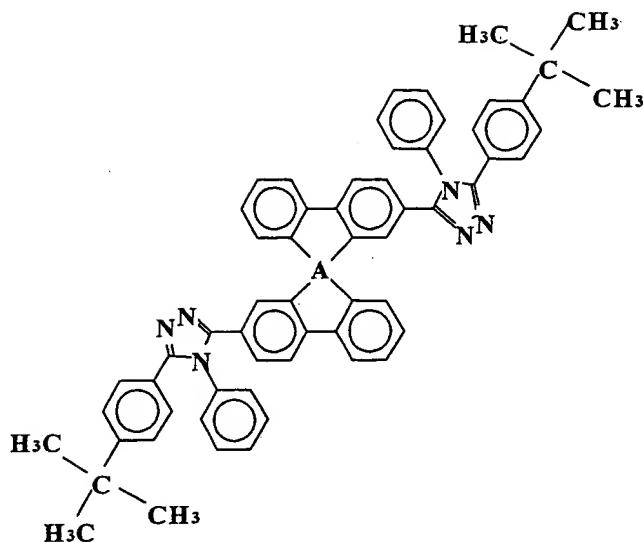
at least an organic luminescent layer ~~comprising an organic compound, said luminescent layer~~ capable of converting triplet excitation energy into light to be emitted; and

a hole blocking layer provided adjacent to said luminescent layer,

wherein said hole blocking layer comprises a material expressed by the following formula,

and

wherein "A" indicates one of carbon or silicon



10. (Original) An electronic appliance comprising said light emitting device according to claim 9, wherein said electronic appliance is selected from the group consisting of an organic electroluminescence display, a video camera, a digital camera, a portable computer, a personal computer, a mobile telephone, and an acoustic equipment.

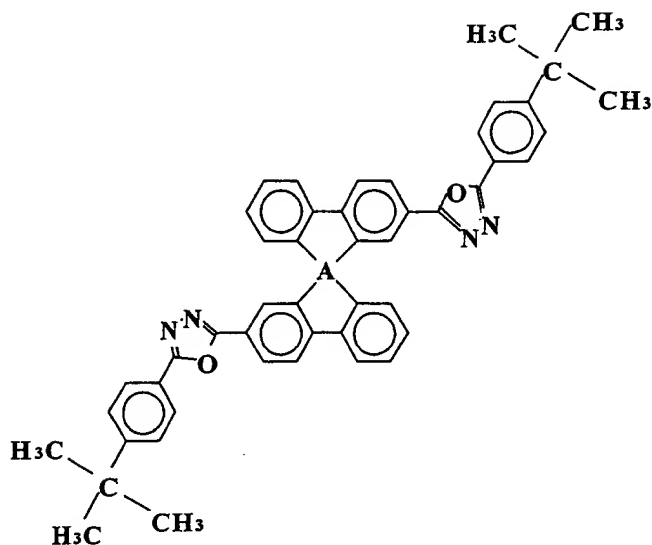
11. (Currently amended) A light emitting device comprising an organic electroluminescence element, said electroluminescence element comprising:

at least an organic luminescent layer ~~comprising an organic compound, said luminescent layer~~ capable of converting triplet excitation energy into light to be emitted; and

a hole blocking layer provided adjacent to said luminescent layer,

wherein said hole blocking layer comprises a material expressed by the following formula, and

wherein "A" indicates one of carbon or silicon



12. (Original) An electronic appliance comprising said light emitting device according to claim 11, wherein said electronic appliance is selected from the group consisting of an organic electroluminescence display, a video camera, a digital camera, a portable computer, a personal computer, a mobile telephone, and an acoustic equipment.

REMARKS

It is respectfully submitted that this amendment merely places the application in a condition for allowance. No further search should be necessary in response to this amendment. Accordingly, it is requested that the amendment be entered at this time.

Applicants will now address each of the Examiner's rejections in the order in which they appear in the Final Rejection.

Claim Rejections – 35 USC §112

In the Final Rejection, the Examiner rejects Claims 1-12 under 35 USC §112, first paragraph, as failing to comply with the written description requirement. This rejection is respectfully traversed.

In particular, the Examiner appears to be objecting to the deletion of the term "organic" in Amendment A. In order to advance the prosecution of this application, Applicants are now amending the claims to recite "organic." As it is believed that this overcomes the Examiner's objection, it is respectfully requested that the rejection be withdrawn.

Claim Rejections – 35 USC §103

The Examiner also rejects Claims 1-4 under 35 USC §103(a) as being unpatentable over O'Brien et al. or Baldo et al. in view of Salbeck et al. and Claims 5-12 under 35 USC §103(a) as being unpatentable over Grishin et al. in view of Salbeck et al. These rejections are respectfully traversed.

Applicants respectfully submit that the combination of references to arrive at the claimed invention is improper. In particular, Salbeck merely discloses a spiro compound and does not

disclose or suggest any motivation, intention or reason for applying the spiro compound for an EL element. In order to emit phosphorescence, it is necessary to obtain a larger excitation

energy than the excitation energy of a material that emits phosphorescence. Although ~~singlet~~ triplet excitation energy is larger than ~~triplet~~ singlet excitation energy, a ~~singlet~~ triplet luminescent material has a material.

small molecular weight, and molecular stability is low, which tends to cause morphological change. However, by applying the spiro compound to an EL element, both larger excitation energy for emitting phosphorescence and high molecular stability can be obtained since the molecular weight of the compound is increased, and the larger excitation energy is maintained. This is one of Applicants' reasons and intentions in discovering and deciding to use the spiro compound in the present invention. Since Salbeck does not disclose or suggest any such reason and intention, one skilled in the art would not be lead to make such a substitution. Hence, the combination of these references to arrive at the claimed invention is improper, and the claims are patentable over these references.

Accordingly, it is respectfully requested that these rejections now be withdrawn.

Conclusion

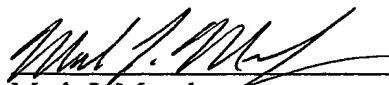
It is respectfully submitted that the present application is in a condition for allowance and should be allowed.

If any fee is due for this amendment, please charge our deposit account 50/1039.

Favorable reconsideration is earnestly solicited.

Respectfully submitted,

Date: November 10, 2004.



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